Application of a Computer Aided Design Program for Shells with Aluminum Alloy Gusset Joints—Case Study

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Abstract

The Shanghai Planetarium, due for completion in 2020, will be the world's largest planetarium. An inverted dome with a span of 41.9 m (137.5 ft) is one of the most attractive parts in the building. This dome is a bowl-shaped single-layer latticed shell with aluminum alloy gusset joints, and it satisfies the requirements of both architectural aesthetic and structural rationality. However, the workload will be burdensome if the inverted dome is designed by the traditional design method. This paper introduces an effective method to simplify the process of preparing construction drawings. The 2D shop drawings of joints and members, as well as the 3D model of the shell, can be generated automatically with the program in the ObjectARX-based platform, to assist the manufacture and assembly of the shell. Compared with the conventional method, this newly-developed program can make the design process more automatic and efficient.

Figure 1: Inverted aluminum alloy single-layer dome in Shanghai Planetarium